

**IMPLEMENTATION OF DISCOVERY LEARNING MODEL OF  
ASSESSMENT FOR LEARNING (AFL) BASED IN LEARNING  
MATHEMATICS BASED ON OPTIMISM OF STUDENT**



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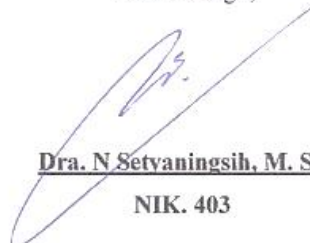
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NEGERI 1 BANYUDONO

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# **IMPLEMENTATION OF DISCOVERY LEARNING MODEL OF ASSESSMENT FOR LEARNING (AFL) BASED IN LEARNING MATHEMATICS BASED ON OPTIMISM OF STUDENT**

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## **ABSTRACT**

The aim of research to describe and analyze: (1) the effect of mathematics learning with Discovery Learning model and Discovery Learning model of Assessment for Learning (AfL) based to mathematics achievement, (2) the effect of student's optimism to mathematics achievement, (3) the interaction between learning model and student's optimism to mathematics achievement. The type of the research is experiment with quasi experimental design. The population of the research was all students of XI Grade of SMK Negeri 1 Banyudono of even semester of academic year 2014/2015. The research sample consisted of two classes. The sampling technique use cluster random sampling. Methods of data collection use test, questionnaires and documentation. Data analyzed by analysis of variance with two different cell lines. The results of data analysis with a significance level of 5% was obtained: (1) there is effect of Discovery Learning model and Discovery Learning model of Assessment for Learning (AfL) based to mathematics achievement, with  $F_A = 22,48254$  (2) there is effect of student's optimism for mathematics achievement, with  $F_B = 7,98365$  (3) there is no interaction between Discovery Learning model and Discovery Learning model of Assessment for Learning (AfL) based with student's optimism to mathematics achievement, with  $F_{AB} = 2,91883$ .

**Keyword:** Discovery Learning, AfL, Optimism, Mathematics Achievement.

## INTRODUCTION

Education is one of the important things in life. The quality of life need to improve for every person required quality education. Good or bad education in a country may determine the changes that occur in the future. But the reality of learning outcomes in Indonesia is not in accordance with the expectations that exist specifically for the learning of mathematics. Mathematics learning achievement of students is still relatively low. This is indicated by the rank of the learning achievement of students in the international arena. Based on data from Trends in International Mathematics and Science Study (TIMSS) in 2011, Indonesia is ranked below. It is show that ranked 38<sup>th</sup> of 42 countries (<http://edukasi.kompas.com>). While data from the Programme for International Student Assessment (PISA) in 2012, Indonesia was ranked very low, ranking 64<sup>th</sup> out of 65 countries (<http://m.okezone.com>).

The low of students achievement in mathematics learning also experienced by SMK Negeri 1 Banyudono. It is seen from the data of the National Exam 2013/2014 school year, which represents an average score of National Examination in Mathematics at 7.09. The lowest scores in the National Examination showed the subjects of mathematics is 2.25. It is the lowest value compared with Indonesian score is 4.00 and English score is 3.60 (Source: Department of Education, Youth and Sports Boyolali). Therefore, it takes effort that can help increase the students' learning achievement, through the improvement of the quality of teaching mathematics at SMK Negeri 1 Banyudono.

The low learning achievement of students at SMK Negeri 1 Banyudono influenced by several factors. Applying the model of learning in the classroom, is expected to increase the potential and ability of students actively. Models of good teaching is learning model that is able to guide students in active learning in order to reach the goal of optimal learning. Therefore, it takes innovation in learning mathematics.

Learning model that can make students become the center of learning activities, one of which is learning model Discovery Learning. In this model,

teachers act as mentors to provide the opportunity for students to learn actively, as the opinion of the teacher should be able to guide and direct the learning activities of students in accordance with the objectives. Such conditions would like to change the teaching and learning activities of teacher-oriented to student-oriented (Kemendikbud, 2013). Hamalik in Ilahi (2012: 29) states that the discovery is a learning process that focuses on the intellectual mental students in solving various problems encountered, so find a concept or generalizations that can be applied in the field.

To improve achievement learning of student not only innovative learning model, but the model assessment is also required. Model Assessment for Learning (AfL) is an assessment model that can help students better understand and master the subject matter provided, by providing opportunities for students to take more responsibility for their own learning. With the implementation of Assessment for Learning (AfL) makes learning has clear objectives and in accordance with the achievement of the expected competencies (Basuki and Hariyanto, 2014: 159).

Learning model and an innovative assessment model can be supported by the characteristics of the students to improve students' learning achievement. One of the characteristics of the students that optimism in solving problems in learning. According to Seligman (1995) in Waruwu (2006: 56) optimism is how a person's positive attitude towards the state. This character is more focused on how someone explain the cause of a good or a bad state. Differences optimism every student affect student learning of mathematics achievement. Yates (2002: 11) states that students who have an attitude of pessimism decreased mathematics achievement over time, while having an attitude of optimism has learning achievement better. By knowing the difference optimism and tailored to each student learning and assessment models, is expected to improve the quality of learning mathematics.

This research aims to describe and analyze: (1) the different effect of mathematics learning with Discovery Learning model and Discovery Learning model of Assessment for Learning (AfL) based to mathematics achievement, (2) the different effect of student's optimism to mathematics achievement, (3) the

interaction between learning model and student's optimism to mathematics achievement.

## **RESEARCH METHODS**

The research was conducted in SMK Negeri 1 Banyudono. This research is experimental research with quasi-experimental designs that have a control group, but it can not function fully to control external variables that affect the execution of the experiment (Sugiyono, 2011: 77). The population in this study were all students of class XI semester SMK Negeri 1 Banyudono 2014/2015 school year. Sampling use cluster random sampling technique. The samples are XI class AK 1 and XI AK 2 class. Then the samples tested by t-test balance before each class is given treatment to determine whether the samples have the same mean.

There are two variables in this study is the dependent variable and independent variables. The dependent variable is mathematics achievement and the independent variable is the model student learning and optimism. Collecting data using test method to obtain students' mathematics learning achievement data, the questionnaire method to collect data on students' mathematics learning optimism and documentation methods to obtain the data prior knowledge of students with Final Examination Semester on odd. Instruments in this study a questionnaire and tests to obtain data values and optimism student learning achievement in mathematics learning process, then tested before being given to the sample to determine whether the instrument qualify the validity and reliability.

Data analysis techniques use to test this hypothesis using two-way analysis of variance of different cells. Before do the analysis of variance, the prerequisite test use Liliefors method to test for normality and Bartlett method to test for homogeneity of variance. Then, the result of the analysis of variance is  $H_0$  rejected. It is need to multiple comparison test using Scheffe method.

## **RESULTS AND DISCUSSION**

Based on the test results of the balance of Discovery Learning and Discovery Learning model of Assessment for Learning (AfL) based have a mean

equal. Further the class got 4 times treatment. Then the two classes in the test with the same instrument. Data results of tests subjected to test normality and homogeneity of variance test. Normality test results concluded that each sample comes from a normal distribution of population. Similarly, homogeneity of variance test results concluded that the population has a homogeneous variance.

To test the hypothesis using two-way ANOVA different cells. By using a 5% level of significance, the results of the calculation of two-way analysis of variance with unequal cells are presented in the following table:

Table 1. Summary of Two-Way Analysis of Variance in Different Cells

Sources of Variance	<i>JK</i>	<i>DK</i>	<i>RK</i>	<i>F</i>	<i>F<sub>α</sub></i>	Decision of <i>H<sub>0</sub></i>
Learning Model (A)	1856.096	1	1856.096	22.48254	4.00	<i>H<sub>0</sub> rejected</i>
Optimism (B)	1318.216	2	659.1079	7.983649	3.15	<i>H<sub>0</sub> rejected</i>
Interaction (AB)	481.9417	2	240.9709	2.918834	3.15	<i>H<sub>0</sub> accepted</i>
Error	4870.876	59	82.55722	-	-	-
Total	8527.13	64	-	-	-	-

Based on Table 1 it can be concluded: (1)  $H_{0A}$  is rejected with  $F_A = 22,48254$ , it indicates that there is a difference between the effect of Discovery Learning model of Assessment for Learning (AfL) based and the Discovery Learning model to mathematics achievement, (2)  $H_{0B}$  is rejected with  $F_B = 7,983649$ , it is means that there is a difference between the effect of optimism high, medium, and low on mathematics achievement, and (3)  $H_{0AB}$  accepted with  $F_{AB} = 2,918834$ , it indicates that there is not interaction between students' learning model and optimism for mathematics achievement.

Table 2. Summary of Average Marginal Student Achievement

Learning Model	Optimism Students			Average Marginal
	High	Medium	Low	
<b>DL model of AfL based</b>	85.55556	78.46154	81.5	81.83903
<b>DL</b>	80	70	63.07692	71.02564
<b>Average Marginal</b>	82.77778	74.23077	72.28846	

After calculation in accordance with Table 2 the average values obtained marginal grade mathematics achievement of Discovery Learning model of Assessment for Learning (AfL) based is 81.83903 whereas for class DL is 71.02564. This means that the learning achievement of students were subjected to treatment with Discovery Learning model of Assessment for Learning (AfL) based provides better performance compared to the subject class learning model Discovery Learning.

In the Discovery Learning model of Assessment for Learning (AfL) based, the teacher gives feedback in the classical form of written explanations on the board about student issues are poorly understood. Therefore, more students master the material being taught. Thus, students who are Discovery Learning model of Assessment for Learning (AfL) based during the learning takes over control of the material being taught that the material Statistics. Mansyur (2011: 88) in the journal also stated that the AfL models can improve students' understanding of mathematics as well as an effective material for improving the quality of mathematics teaching.

Table 3. Results Test Fold Comparison Between Column

$H_0$	$H_1$	$F$	$(2)F_{0,05;2;59}$	Decision
$\mu_T = \mu_S$	$\mu_T \neq \mu_S$	3.,40555	6.30	$H_0$ rejected
$\mu_T = \mu_R$	$\mu_T \neq \mu_R$	53.82893	6.30	$H_0$ rejected
$\mu_S = \mu_R$	$\mu_S \neq \mu_R$	2.146755	6.30	$H_0$ accepted



In Table 3, it can be seen which of the different effect, obtained value that  $F_{T-S} = 3.40555$ . This suggests that there are differences in learning outcomes between students of high and moderate optimism. By comparing the average marginal optimism high students are 82.77778 and average marginal of optimism are 74.23077 conclusion that optimism high students provide better learning achievement than students optimism being.  $F_{T-R} = 53.82893$  indicates that there is a difference between students with high and low optimism. By comparing the average marginal optimism high students are 82.77778 and average low marginal of optimism 72.28846 conclusion that optimism high student provides better learning achievement than low student optimism. The value is  $F_{S-R} = 2.146754$ . This means that there is no difference in learning achievement between the medium and low optimism. Therefore, students with high optimism has better learning achievement than students with moderate and low optimism. Ruthig (2004: 724) in his journal indicates optimism influence on learning achievement.

To find the answer in the learning model Discovery Learning students are required active, whereas only be a resource teacher in charge of provoking ideas students with questions. Thus, it takes a good performance of the student to find a concept or answers based on research procedures. In the learning of students with high optimism has good performance to complete the given problem. The results are consistent with the journal of Temidayo (2013: 74) that optimism is one of the determinants of academic performance of students in learning and a strong factor in determining student achievement.

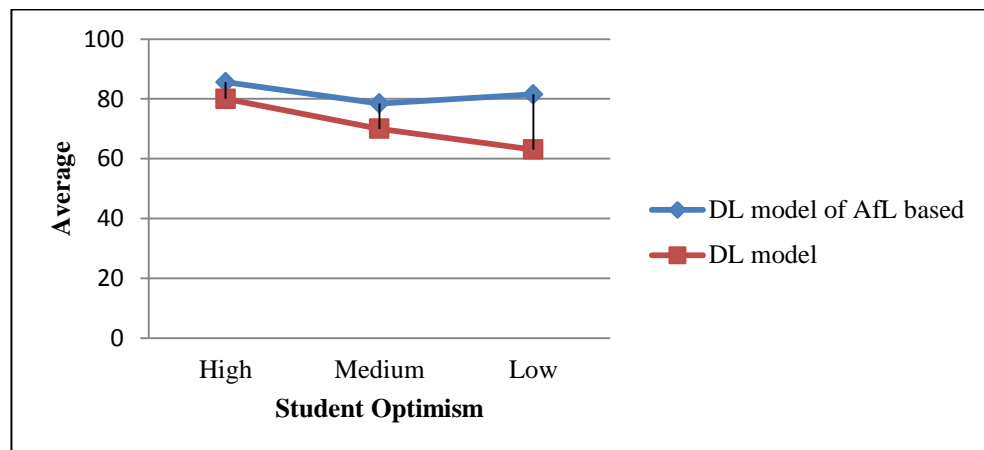


Figure 1. Graph Profile Effect Variable Learning Model

To determine that there is interaction or not, it can be seen from the graph profile independent variables in Figure 1. In the first free variable profile is learning model and the second independent variable profile is optimism that students do not intersect and optimism student learning models tend to no interaction between them. The Discovery Learning model of Assessment for Learning (AfL) based and the Discovery Learning model, students with high optimism has better learning achievement of students with moderate and low optimism, students with moderate optimism has the same learning achievement of students with low optimism. On students with high optimism, medium or low, Discovery Learning model of Assessment for Learning (AfL) based has a better learning achievement than learning model Discovery Learning. Proved that there is no interaction between Discovery Learning model of Assessment for Learning (AfL) based, learning using learning model Discovery Learning, and optimism students' mathematics achievement.

## CONCLUSION

Based on the results and discussion, it can be concluded that: (1) There is a difference between the effect of the use Discovery Learning model of Assessment for Learning (AfL) based and the Discovery Learning model to mathematics achievement of students. It is based on analysis of data obtained  $F_A = 22,48254$ .

Marginal average value of learning achievement of students who are the Discovery Learning model of Assessment for Learning (AfL) based is higher than the average marginal value learning achievement of students who use the Discovery Learning model. It can be concluded that the Discovery Learning model of Assessment for Learning (AfL) based is better than the Discovery Learning model. (2) There is a difference in the effect of optimism on mathematics achievement of students. It is obtained from analysis of the data is  $F_B = 7,983649$ . Students who have high optimism had mathematics learning achievement higher than students who have low optimism. Likewise with students who have moderate optimism tend to have better learning achievement than students who had low optimism. (3) There is no interaction between students learning model with optimism to the mathematics learning achievement of students with  $F_{AB} = 2,918834$ .

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